

PRACTICAL INFORMATION

Lorentz Center @omega and @lambda

2nd floor Snellius building

Niels Bohrweg 1

2333 CA Leiden

The Netherlands

+31 71 527 5400

info@lorentzcenter.nl

Parking

Should you come by car, you can use the parking behind the SRON building.

You can only park there if you have reserved a space.

Please contact your workshop coordinator or contact person at the Lorentz Center.

If you are using your navigation system go to: Niels Bohrweg 4, 2333 CA Leiden.

To gain access, please use the intercom and mention that you are a Lorentz Center guest.

How to get there:

By public transport

The Lorentz Center is within easy reach of Leiden Central Station. From Schiphol airport, trains to Leiden Central Station depart every 15 minutes. It takes about 20 minutes to reach Leiden.

See [train tickets and time tables](#).

From Leiden Central Train Station (exit city center) it takes about 7 minutes by bus. You can check in with an [OV chip card](#) or you can buy a ticket on the bus (payment only by credit or debit card).

See [bus time tables](#).

From Leiden Central Station, exit LUMC, it is a 20 minute walk to the Lorentz Center.

By car

For navigation systems please use destination: Niels Bohrweg 4 or postal code 2333 CA. Or plan your route via route planner.

PRELIMINARY TIMETABLE

Day	Main topics	Chairperson
Monday 1 st	Main noise sources, scope definition, and introduction	Roberto
Tuesday 2 nd	Perceptual experiments (At NLR, trip by bus!)	Susanne
Wednesday 3 rd	Auralization	Ingrid
Thursday 4 th	Psychoacoustic metrics	Antonio
Friday 5 th	Perception driven technology and design, wrap up	Lothar

MONDAY 1st JUNE

Time	Main topics	Chairperson	Comments
12:00 – 13:00	Walk-in lunch + registration	Lorentz Center	Lunch at the Lorentz Center
13:00 – 13:15	Welcome speech by Lorentz Center	Lorentz Center	Practical details for during the workshop, WiFi access, catering, etc.
13:15 – 14:00	Presentations and Q&A : Overview of aerospace noise sources and introduction to the concept of perception-influenced design (PID) in aerospace engineering and	Roberto	Introduction to the workshop, set the overall scope and common goal. Establish a “common language” with some basic definitions. Measurement vs. perception.
14:00 – 15:30	Break-out session : Main noise sources in aerospace engineering	Roberto and all	State-of-the-art, current challenges, and potential noise reduction techniques: <ul style="list-style-type: none"> • Airframe (incl. wind turbines) • Engine / jet • Propellers/rotors/drones/UAM • Others (e.g. cabin noise, automotive, home appliances) Conduct a survey (e.g. Vevox/Mentimeter/blackboards) to determine which noise sources we would like to focus on during the workshop. Optional : Define a particular design/source throughout the workshop and revisit the outcomes at the end. (to be discussed).
15:30 – 16:00	Coffee break	Lorentz Center	
16:00 – 17:00	Interactive discussion : Sound acquisition methods	Roberto	Provocative statements at the beginning to spark discussion. What methods are available (measurements, simulations, low-order models, auralization)? Main challenges. What are the requirements (e.g. accuracy)? Talks/Discussions : <ul style="list-style-type: none"> - Jacopo Grassi: A framework for noise perception-driven design for propellers - Adil Belaarbi: What is the perspective from regulators? - Ted Gan: Presentation of his lab (MTU) - How accurate is “accurate enough”?
17:00 – 17:30	Wrap-up of the day	Roberto	Report the main conclusions and outcomes of the day.
17:30 – 19:30	Welcome reception	Lorentz Center	Networking drinks and bites

TUESDAY 2nd JUNE

Time	Main topics	Chairperson	Comments
09:15 – 09:30	Gather at Lorentz Center entrance	-	Gather for the bus to leave on time
09:30 – 10:30 (approx.)	Bus from Lorentz Center to NLR Amsterdam and walk-in	-	The bus leaves at 09:30 sharp! Please make sure to provide the contact information to the Lorentz Center as NLR has strict security rules
10:30 – 11:15	Presentations and Q&A: Perceptual and psychoacoustic experiments	Susanne	<p>Topics:</p> <ul style="list-style-type: none"> - Motivation to investigate annoyance/role for health outcomes, - Best practice, types of surveys/experiments, requirements in terms of sample population, towards common standards. - The need for ecological validity. <p>Talks:</p> <ul style="list-style-type: none"> - Introduction: Overview over role of annoyance & its assessment methods (Dirk Schreckenberg & Susanne Bartels) - Best practices and recent experimental procedures (Roberto Merino Martinez) - Optimized process to perform psychoacoustic tests, from measurements/synthesis to analysis (Isabelle Boulet)
11:15 – 11:30	Coffee break	NLR	
11:30 – 13:00	Interactive discussion: Future scope in perceptual experiments	Susanne	<p>Topics:</p> <ul style="list-style-type: none"> - From short-term annoyance to long-term annoyance? - How to extend findings from laboratory studies to realistic conditions. - A critical appraisal of immersive testing environments and the use of VR for visual cues - Beyond self-reports: physiological outcome variables - (Statistical) analysis methods and the use of AI and Machine Learning <p>Talks:</p> <ul style="list-style-type: none"> - Extending findings from laboratory studies to realistic conditions using VR and new laboratory settings (Roalt Aalmoes / Naomi Sieben) + Interactive Discussion - Electrodermal and Subjective Responses to Road Traffic Noise in Virtual Acoustic Environments (Leon Müller) + Interactive Discussion - Analysis methods incl. the use of AI & machine learning, (Julian Becker) + Interactive Discussion - Third topic: e.g. "from short-term annoyance to long-term annoyance", "future research needs" or another topic considered relevant during the 1st day. Interactive discussion
13:00 – 14:00	Lunch	NLR	Lunch at NLR
14:00 – 17:00	Tour visit: NLR Amsterdam	Susanne, Roalt Aalmoes, and NLR colleagues	Visit the facilities (incl. new Lounge for perceptual experiments) of the Royal Netherlands Aerospace Centre in Amsterdam (Anthony Fokkerweg 2, 1059 CM Amsterdam).
17:00 – 18:00 (approx.)	Bus from NLR Amsterdam back to Lorentz Center	-	The bus will stop at the Lorentz Center, Train station Leiden and Hotel van der Valk

WEDNESDAY 3rd JUNE

Time	Main topics	Chairperson	Comments
09:30 – 09:45	Walk in	-	
09:45 – 10:55	Presentations and Q&A: Sound auralization	Ingrid	1) Josephine Pockelé "Overview of Auralization methods in Aerospace applications" 2) Paul Rodriguez "OCTAVES – the AIRBUS VR reproduction system" 3) Andrea Bresciani/Julien Maillard "Auralization of Wind Turbine Noise"
10:55 – 11:15	Coffee break	Lorentz Center	
11:15 – 12:00	Interactive discussion: Towards realistic and plausible auralizations	Ingrid	Intro (Ingrid) Topics to be addressed: -Source and propagation path modelling. What are the requirements for modelling accuracy, time step, etc., for realistic auralizations? -What physical phenomena do we need to account for (ground reflections, wind, atmospheric turbulence, background sounds etc.)? Added value vs. extra complexity? -How to validate auralizations? towards quality criteria -
12:00 – 13:00	Lunch	Lorentz Center	Lunch at the Lorentz Center
13:00 – 14:15	Practical session: In-situ listening experiments (including auralizations)	Ingrid and all	Ingrid: "Impact of models and background noise on perception of auralized sounds" 2 parallel sessions - Listening exercise with relevant audios, including auralizations with different levels of realism + different background noise to discuss the points from the morning in situ. - Continued interactive discussion
14:15 – 14:45	Coffee break	Lorentz Center	
14:45 – 16:00	Practical session: In-situ listening experiments - continuation	Ingrid and all	Continuation of 2 parallel sessions
16:00 – 16:30	Wrap-up of the day	Ingrid	Report the main conclusions and outcomes of the day.
16:30 – 18:00	Free time	-	
18:00 - 19:00	Boat tour of the city of Leiden	Lorentz Center	Organized by Restaurant Verboden Toegang in Leiden (Kaiserstraat 7, 2311 GN Leiden)
19:00 - 22:00	Workshop dinner	Lorentz Center	Restaurant Verboden Toegang in Leiden (Kaiserstraat 7, 2311 GN Leiden)

THURSDAY 4th JUNE

Time	Main topics	Chairperson	Comments
09:30 – 09:45	Walk in	-	
09:45 – 10:45	Presentations and Q&A: Noise annoyance assessment	Antonio J Torija Martinez	Antonio <ul style="list-style-type: none"> • Definition of noise metrics and noise annoyance • Noise metrics for aircraft noise: Event-based; Exposure • Gaps and limitations / new sources Michael <ul style="list-style-type: none"> • Psychoacoustic Metrics and Psychoacoustic Annoyance Speakers: Antonio J Torija, Michael Lotinga.
10:45 – 11:15	Coffee break	Lorentz Center	
11:15 – 12:00	Interactive discussion: Beyond the decibel - Future metrics and assessment	Antonio J Torija Martinez & Michael Lotinga	5 minutes introduction (Antonio) 30 minutes discussion (led by Antonio and Mike) 10 minutes recap (Antonio and Mike) Topics: <ul style="list-style-type: none"> • When and how psychoacoustic metrics would be helpful? • What we need to do to make them helpful and applicable? • Accuracy vs. complexity • Multi-modal metrics and physiological responses. • Gaps: E.g., For PID, Linking physics with perception
12:00 – 13:00	Lunch	Lorentz Center	Lunch at the Lorentz Center
13:00 – 14:30	Break-out session: Choosing the right metrics per application	Antonio J Torija Martinez & Michael Lotinga	<ul style="list-style-type: none"> • Introduction with two examples: <ul style="list-style-type: none"> ◦ Introduction to session (5 minutes): Antonio ◦ Example 1 – Greenjets (10 minutes): Antonio ◦ Example 2 – RefMap (10 minutes): Mike • Working in groups: (45 minutes) <ul style="list-style-type: none"> ◦ Define case study (based topics discussed during workshop) ◦ Decide a metric or set of metrics ◦ Justify why the proposed metric(s) will outperform current metrics using in aerospace (e.g., LAeq, EPNL) ◦ What data or methods are needed for the proposed metric (focus on practicalities) ◦ Discussion on limitations of proposed metric(s) • Report to the room - 1 per table (20 minutes)
14:30 – 15:00	Coffee break	Lorentz Center	
15:00 – 16:30	Practical tutorial: Open-access software in acoustics	Michael Lotinga & Roberto	<ul style="list-style-type: none"> • Ideally at least 1 laptop per table with MATLAB licence to run SQAT • Introduction to SQAT (10 minutes) • Calculation of psychoacoustic metrics for a given set of sounds • Have precalculated metrics for discussion.
16:30 – 17:00	Wrap-up of the day	Antonio J Torija Martinez	Report the main conclusions and outcomes of the day.

FRIDAY 5th JUNE

Time	Main topics	Chairperson	Comments
09:30 – 09:45	Walk in	-	
09:45 – 10:45	Presentations and Q&A: Holistic perception-driven technology design	Lothar	<p>Including perception within the design loop. Successful examples in literature and recent research. How to model the effect (in perception) of noise reduction measures? Does the design change a lot if we minimize annoyance vs minimizing noise in dB?</p> <p>Potential talks (TBD):</p> <p>Nejc Cerkovnik Michael Bauer (“<i>How to account for noise annoyance within aerospace design?</i>”) Roberto Merino-Martinez</p> <p>and other participants who would like to share their experiences in this area.</p>
10:45 – 11:15	Coffee break	Lorentz Center	
11:15 – 12:00	Interactive discussion: How to achieve PID in practice?	Lothar and all	Simplicity vs accuracy of approaches. What are the minimum requirements? How fast do the computations of metrics/perception need to be in the conceptual design loop?
12:00 – 13:30	Lunch	Lorentz Center	Lunch at the Lorentz Center
13:30 – 14:45	Interactive discussion: Collective wrap-up brainstorming session	Lothar and all	<p>Wrap up the workshop with main guidelines and recommendations for industry and policy makers.</p> <p>Revisit the objectives set at the beginning of the workshop and assess the outcomes.</p> <p>Future steps and outlook.</p> <p>Report outcomes in white paper?</p>
14:45 – 15:00	Formal closure of the workshop	Roberto and all	